



WATER QUALITY INTRODUCTION & COMPLIANCE WORKSHOP

STORMWATER MANAGEMENT

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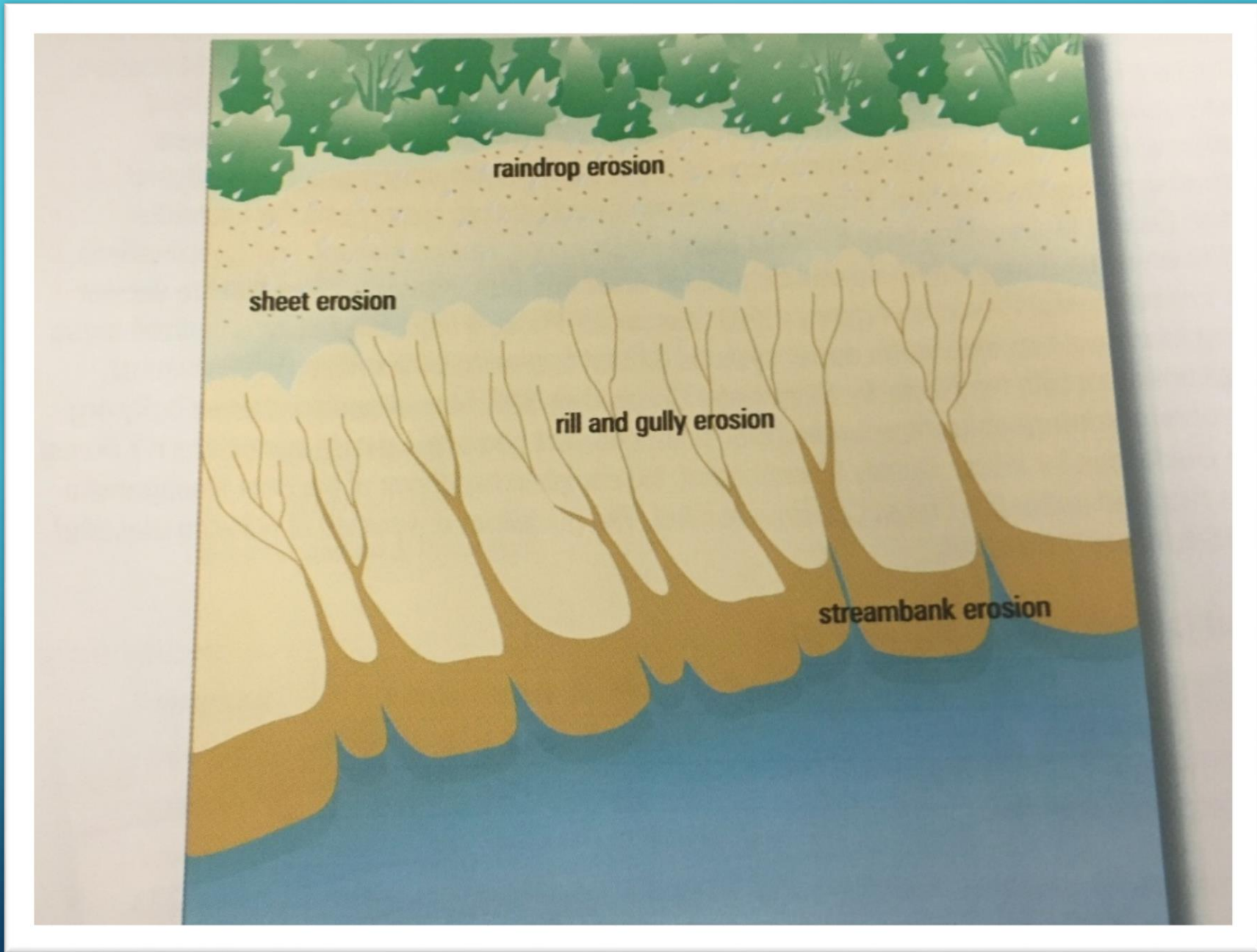
WHAT IS EROSION:

EROSION IS THE ACTION OF SURFACE PROCESSES (SUCH AS WATER FLOW OR WIND) THAT REMOVES SOIL, ROCK, OR DISSOLVED MATERIAL FROM ONE LOCATION ON THE EARTH'S CRUST, AND THEN TRANSPORTS IT AWAY TO ANOTHER LOCATION



RAINFALL, AND SURFACE RUNOFF WHICH MAY RESULT FROM RAINFALL, PRODUCES FOUR MAIN TYPES OF SOIL EROSION:

- SPLASH EROSION, THE IMPACT OF A FALLING RAINDROP CREATES A SMALL CRATER IN THE SOIL, EJECTING SOIL PARTICLES. THE DISTANCE THESE SOIL PARTICLES TRAVEL CAN BE AS MUCH AS **0.6 M (TWO FEET) VERTICALLY AND 1.5 M (FIVE FEET) HORIZONTALLY** ON LEVEL GROUND.
- SHEET EROSION, IF THE SOIL IS SATURATED, OR IF THE RAINFALL RATE IS GREATER THAN THE RATE AT WHICH WATER CAN INFILTRATE INTO THE SOIL, SURFACE RUNOFF OCCURS. SHEET EROSION IS THE TRANSPORT OF LOOSENED SOIL PARTICLES BY OVERLAND FLOW.
- RILL EROSION REFERS TO THE DEVELOPMENT OF SMALL, EPHEMERAL CONCENTRATED FLOW PATHS WHICH FUNCTION AS BOTH SEDIMENT SOURCE AND SEDIMENT DELIVERY SYSTEMS FOR EROSION ON HILLSLOPES. FLOW DEPTHS IN RILLS ARE TYPICALLY OF THE ORDER OF A FEW CENTIMETERS (ABOUT AN INCH) OR LESS AND ALONG-CHANNEL SLOPES MAY BE QUITE STEEP.
- GULLY EROSION OCCURS WHEN RUNOFF WATER ACCUMULATES AND RAPIDLY FLOWS IN NARROW CHANNELS DURING OR IMMEDIATELY AFTER HEAVY RAINS OR MELTING SNOW, REMOVING SOIL TO A CONSIDERABLE DEPTH.













A decorative graphic on the left side of the slide, consisting of a network of light blue lines and circles of varying sizes, resembling a circuit board or a stylized tree structure.

KPDES STORMWATER CONSTRUCTION PERMIT:

THIS PERMIT APPLIES TO STORMWATER DISCHARGES ASSOCIATED WITH CONSTRUCTION ACTIVITIES DISTURBING INDIVIDUALLY ONE (1) ACRE OR MORE, INCLUDING, IN THE CASE OF A COMMON PLAN OF DEVELOPMENT, CONTIGUOUS CONSTRUCTION ACTIVITIES THAT CUMULATIVELY EQUAL ONE (1) ACRE OR MORE OF DISTURBANCE. NON-CONTIGUOUS CONSTRUCTION ACTIVITIES (I.E. ACTIVITIES SEPARATE BY AT LEAST 0.25 MILES) THAT DISTURB MORE THAN ONE (1) ACRE OR MORE SHALL BE CONSIDERED INDEPENDENT ACTIVITIES..

STORMWATER CONSTRUCTION PERMIT REQUIREMENTS.

- 1) STORMWATER POLLUTION PREVENTION PLAN
- 2) MINIMIZE SIZE AND DURATION OF DISTURBANCE
- 3) STABILIZATION REQUIREMENTS.
 - A.) STABILIZE CRITICAL AREAS WITHIN 24 HRS OR AS SOON AS PRACTICAL AFTER COMPLETION OF GRADING.
 - B.) IF NOT ACTIVE FOR MORE THAN 14 DAYS, STABILIZE IT.
- 4) IMPLEMENT BUFFER ZONES



KPDES INDUSTRIAL STORMWATER PERMIT:

401 KAR 5:060, SECTION 8 [40 CFR 122.26, EFFECTIVE JULY 1, 2008] THE FOLLOWING POINT SOURCE DISCHARGES OF STORMWATER RUNOFF ARE SUBJECT TO THE KPDES PERMIT PROGRAM: (1) THE DISCHARGE OF STORMWATER RUNOFF ASSOCIATED WITH INDUSTRIAL ACTIVITY OR (2) A DISCHARGE, AS DETERMINED BY KENTUCKY DIVISION OF WATER (KDOW), THAT CONTRIBUTES TO A VIOLATION OF A WATER QUALITY STANDARD OR IS A SIGNIFICANT CONTRIBUTOR OF POLLUTANTS TO WATERS OF THE COMMONWEALTH.

Major group- first 2 #s	category		examples
10	Metal mining		
12	Coal mining		
13	Oil & Gas	Crude petroleum	Natural gas
14	Mining and quarrying of non metallic minerals	Sand, rock, gravel,	Mineral mining, clay, quarries
20	Food and kindred products		Meat processing Beverage producing, dairy
21	Tobacco products		
22	Textile mill products		

Major group-first 2 #s	Category	Examples
23	Apparel and other finished products.	All forms of clothes, fur goods, curtains and drapes, automotive trimmings, textile bags
24	Lumber and other wood products, except furniture	Logging, saw mills, pallets, flooring containers, mobile homes, wood buildings, wood preserving
25	Furniture and fixtures	Wood and metal furniture, office and store fixtures, household furniture, mattresses
26	Paper and allied products	Pulp, paper, and paperboard mills, boxes, food containers, sanitary paper products, coated and laminated paper.
27	Printing, publishing and allied products	Newspapers, commercial printing, books, greeting cards
28	Chemicals and allied products	Organics, gases, soaps, cleaners, explosives, fertilizers, paint, ink, pharmaceutical
29	Petroleum refining and related products	

Major Group- first 2 #s	Category	Examples
30	Rubber and miscellaneous plastic products	Plastic bottles, tires, tubing, films, hoses, belts, and footwear
31	Leather and leather products	Leather tanning and finishing, handbags, shoes, gloves, luggage
32	Stone clay, glass and concrete products	Concrete, pre-mix, brick & block, glassware, ceramics, wall and floor tile.
33	Primary metal industries	Steel works, foundries, millworks, smelting, die castings
34	Fabricated metal products, except transportation and machinery	Pipes and pipe fittings, ammunition, stampings, nuts and bolts, metal drums
35	Industrial and commercial machinery and computer products	Compressors, machinery, farm equipment, furnaces, computers

Major group- first 2 #s	Category	Examples
36	Electronic and other electrical components	Ranges, light fixtures, circuit boards, batteries, transformers
37	Transportation equipment	Car bodies, missiles, car parts, airplanes, trailers, boats
38	Measuring devices	Temperature controls, laboratory instrumentation, watches, clocks, surgical and medical equipment.
39	Miscellaneous manufacturing	Toys, jewelry, crayons, signs, brushes, caskets, musical instruments.
40	Railroad transportation	terminals



INDUSTRIAL STORMWATER PERMIT REQUIREMENTS.

1) EFFLUENT MONITORING REQUIREMENTS

2) NON-NUMERIC REQUIREMENTS

- CONTROL MEASURES
- MINIMIZE EXPOSURE
- GOOD HOUSEKEEPING
- MAINTENANCE
- SPILL PREVENTION AND RESPONSE PROCEDURES
- MANAGEMENT OF RUN-OFF AND RUN-ON
- TRAINING

WHAT PAPERWORK IS REQUIRED TO BE ON SITE?

1. COPY OF THE CURRENT PERMIT
2. SWPP PLAN
3. SITE MAP
4. SAMPLING INFORMATION, INCLUDING CHAIN OF CUSTODIES AND ANALYTICAL

INFORMATION:

1. RECORDS SHALL BE RETAINED FOR A PERIOD OF AT LEAST FIVE YEARS(OR LONGER) AS REQUIRED BY 401 KAR 5:065, SECTION 2(10)
2. QUARTERLY(OR MORE FREQUENT) SITE INSPECTIONS INCLUDING CORRECTIVE ACTIONS TAKEN IF NEEDED
3. EMPLOYEE TRAINING
4. SPILL HISTORY AND REPORTING

PRE - CONSTRUCTION PLANNING

1. OBTAIN APPROPRIATE PERMITS:

- A. STATE(KYR10)
- B. LOCAL LAND DISTURBANCE PERMITS
- C. WATER RESOURCES PERMIT FOR WORKING ALONG A STREAM AND FLOODPLAIN.
- D. WATER QUALITY PERMIT- 401-404 CERTIFICATION

2. ASSESS SOILS AND SLOPES ON THE SITE

3. IDENTIFY NEARBY STREAMS AND DRAINAGE AREAS

4. PRESERVE EXISTING VEGETATION WHERE POSSIBLE

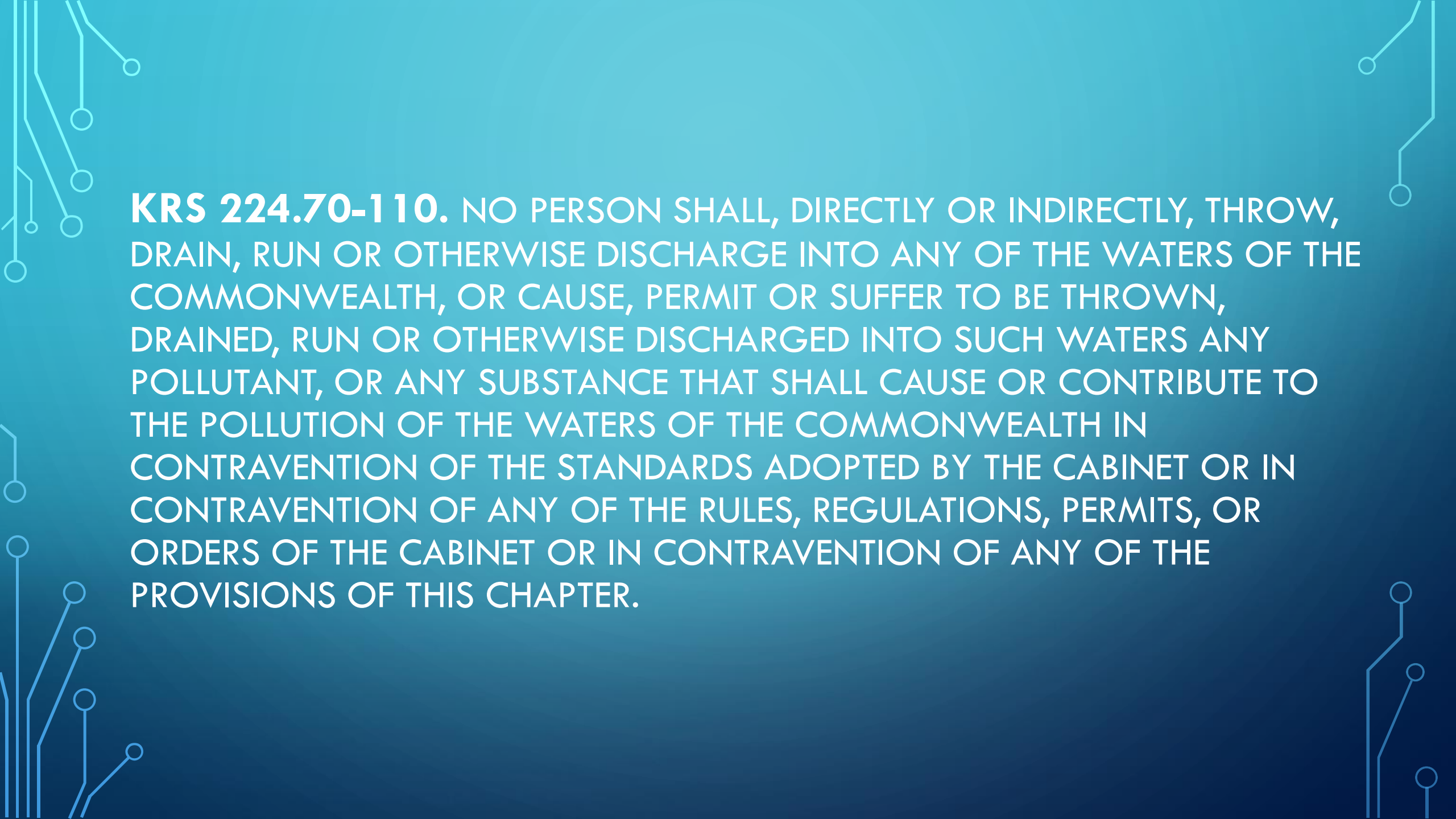
5. MINIMIZE IMPERVIOUS SURFACES

6. DEVELOP AN EROSION AND SEDIMENT CONTROL PLAN (SWPP)

WHAT ARE OUTFALLS?

OUTFALLS ARE LOCATIONS WHERE:

stormwater exits the facility property, including pipes, ditches, swales, and other structures that transport stormwater. If possible, walk outside the boundary of your facility to identify outfalls that may not be apparent from within your site. **Do this during a rain event.**

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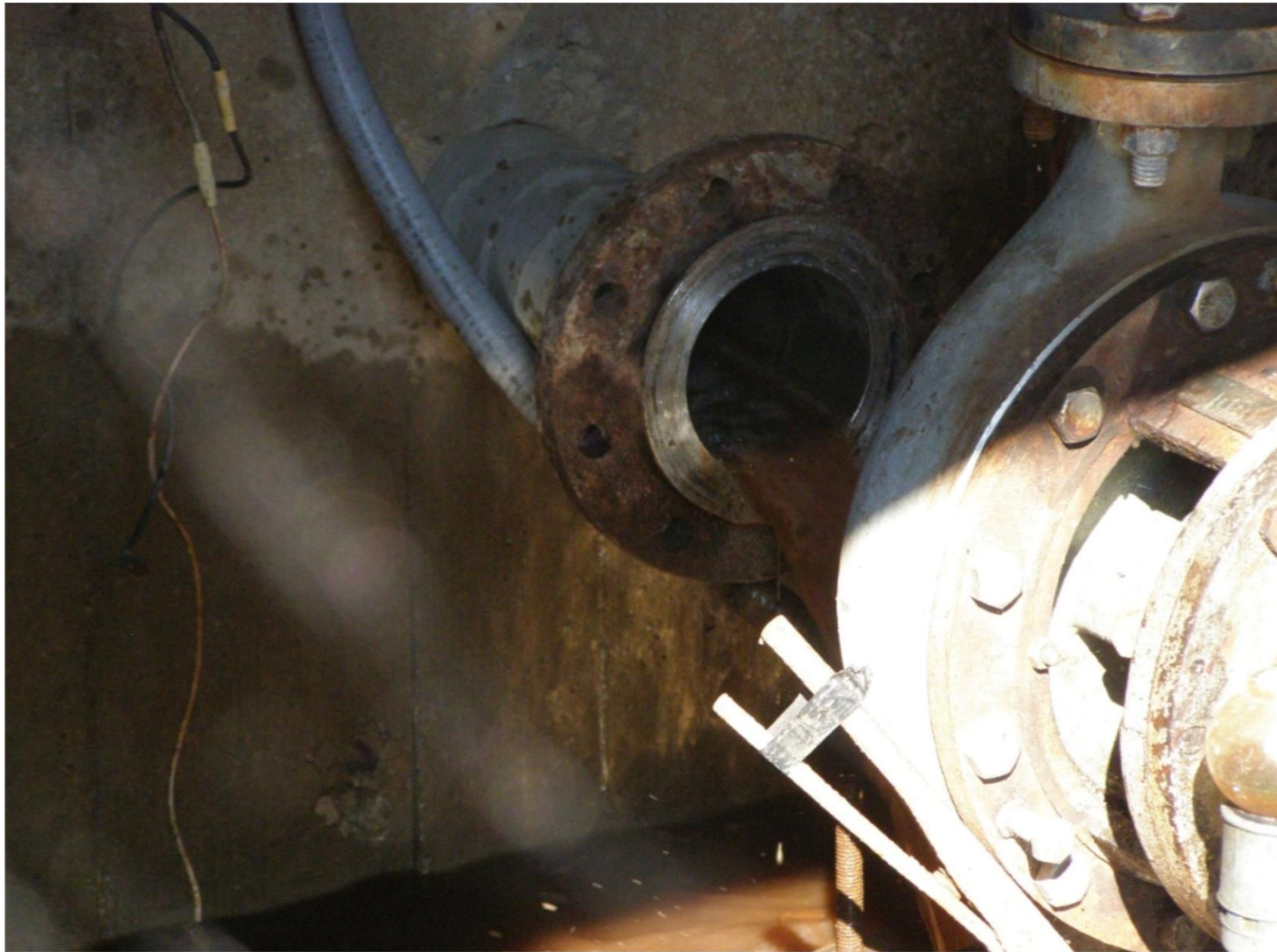
KRS 224.70-110. NO PERSON SHALL, DIRECTLY OR INDIRECTLY, THROW, DRAIN, RUN OR OTHERWISE DISCHARGE INTO ANY OF THE WATERS OF THE COMMONWEALTH, OR CAUSE, PERMIT OR SUFFER TO BE THROWN, DRAINED, RUN OR OTHERWISE DISCHARGED INTO SUCH WATERS ANY POLLUTANT, OR ANY SUBSTANCE THAT SHALL CAUSE OR CONTRIBUTE TO THE POLLUTION OF THE WATERS OF THE COMMONWEALTH IN CONTRAVENTION OF THE STANDARDS ADOPTED BY THE CABINET OR IN CONTRAVENTION OF ANY OF THE RULES, REGULATIONS, PERMITS, OR ORDERS OF THE CABINET OR IN CONTRAVENTION OF ANY OF THE PROVISIONS OF THIS CHAPTER.

401 KAR 10:031 SECTION 2. SURFACE WATERS SHALL NOT BE AESTHETICALLY OR OTHERWISE DEGRADED BY SUBSTANCES THAT:

- (A) SETTLE TO FORM OBJECTIONABLE DEPOSITS;
- (B) FLOAT AS DEBRIS, SCUM, OIL, OR OTHER MATTER TO FORM A NUISANCE;
- (C) PRODUCE OBJECTIONABLE COLOR, ODOR, TASTE, OR TURBIDITY;
- (D) INJURE OR ARE CHRONICALLY OR ACUTELY TOXIC TO OR PRODUCE ADVERSE PHYSIOLOGICAL OR BEHAVIORAL RESPONSES IN HUMANS, ANIMALS, FISH, AND OTHER AQUATIC LIFE;
- (E) PRODUCE UNDESIRABLE AQUATIC LIFE OR RESULT IN THE DOMINANCE OF NUISANCE SPECIES; OR
- (F) CAUSE FISH FLESH TAINING.









MOST INDUSTRIAL STORMWATER PERMITS REQUIRE INSTALLATION AND IMPLEMENTATION OF CONTROL MEASURES TO MINIMIZE OR ELIMINATE POLLUTANTS IN STORMWATER RUNOFF FROM YOUR FACILITY.

THE CONTROL MEASURES YOU CHOOSE FOR YOUR FACILITY MUST BE DOCUMENTED IN YOUR FACILITY-SPECIFIC STORMWATER POLLUTION PREVENTION PLAN (SWPPP).



3. STORMWATER POLLUTION PREVENTION PLAN (SWPPP).

- 3.1. Stormwater Pollution Prevention Team
- 3.2. Site Description
- 3.3. Summary of Potential Pollutant Sources
- 3.4. Description of Control Measures
- 3.5. Schedules and Procedures
- 3.6. Additional Documentation Requirements
- 3.7. Signature Requirements
- 3.8. Required Modifications
- 3.9. SWPPP Availability
- 3.10. Inspections
- 3.11. Corrective Actions

Industrial SWPPP:

water.ky.gov/permitting/Documents/GPWeb/SWPPPoperationtemplate.docx

STORMWATER CONSTRUCTION POLLUTION PREVENTION PLAN:

- 1) SITE DESCRIPTION: FUNCTION, SIGNIFICANT ACTIVITIES, SEQUENCE, TOTAL AREA OF SITE AND HOW MUCH WILL BE DISTURBED.
- 2) SITE MAP
- 3) OTHER INDUSTRIAL ACTIVITIES: ASPHALT OR CONCRETE PLANT ON SITE.
- 4) DOCUMENTATION OF STORMWATER CONTROLS TO REDUCE POLLUTANTS: THIS IS WHERE YOU DESCRIBE WHAT BMPS YOU WILL BE INSTALLING OVER THE LENGTH OF THE PROJECT TO : PREVENT OR MINIMIZE POLLUTANTS ENTERING THE WATERS OF THE COMMONWEALTH.



5) MAINTENANCE OF STORMWATER CONTROLS:
SEDIMENT CONTROL DEVICES TO BE MAINTAINED AT NO MORE
THEN 1 / 3 CAPACITY TO ALLOW FOR SEDIMENT CAPTURE.



6) NON-STORMWATER DISCHARGE MANAGEMENT:
LISTS AUTHORIZED DISCHARGES UNDER THIS PERMIT
EG: FIRE HYDRANT FLUSHING, FIRE FIGHTING ACTIVITIES, DUST
CONTROL.



7) SITE INSPECTIONS:

TWO OPTIONS:

- AT LEAST ONCE EVERY SEVEN CALENDAR DAYS
- OR AT LEAST ONCE EVERY 14 CALENDAR DAYS AND WITHIN 24 HRS AFTER ANY STORM EVEN OF 0.5 INCH OR GREATER.

NOTE: AREAS THAT HAVE UNDERGONE FINAL STABILIZATION INSPECTIONS SHALL BE CONDUCTED AT LEAST ONCE A MONTH UNTIL COVERAGE IS TERMINATED.

PERFORM CORRECTIVE ACTIONS IF NECESSARY. NOTE THE INSPECTION REPORT AND THEN UPDATE THE REPORT WHEN ACTIONS HAVE BEEN PERFORMED.

8) MAINTAIN AN UPDATED PLAN.

9) SIGNATURE, PLAN REVIEW AND MAKING PLANS AVAILABLE.

The background is a solid blue gradient. It is decorated with white, stylized circuit board traces. These traces are located in the corners and along the edges, featuring small circles at various points, resembling solder points or vias. The traces are more prominent in the top-left and bottom-left corners, and less so in the top-right and bottom-right corners.

STORMWATER BMPS NEED TO BE MAINTAINED.
PROBLEM AREAS SHOULD BE IDENTIFIED DURING
REQUIRED SITE INSPECTIONS. DOCUMENT
PROBLEM AREAS AND PERFORM CORRECTIVE
ACTIONS.

FINAL STABILIZATION:

- NO SITE IS CLOSED OUT PROPERLY UNTIL VEGETATION IS ESTABLISHED ON ALL BARE SOIL AREAS AND DITCHES ARE STABLE,
- FILL, GRADE, AND SEED TEMPORARY SEDIMENT TRAPS OR BASINS,
- REMOVE SILT FENCING AFTER STABILIZATION,
- MANAGE TRASH, SUPPLIES AND MATERIALS, AND
- REMOVE TEMPORARY STREAM CROSSINGS





ADDITIONAL MEASURES:

A. GOOD HOUSEKEEPING

B. CONTAINMENT AREAS

C. SPILL KITS


D. TRAINING

E. SITE INSPECTIONS








INSTALLED BMPS AND DISCHARGE AREAS NEED TO BE MAINTAINED IN ORDER TO BE EFFECTIVE.



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BEST MANAGEMENT PRACTICES (BMPS)
ARE PLANNING/OPERATIONAL APPROACHES,
STRUCTURAL INSTALLATIONS, AND OTHER
FIELD PRACTICES FOR REDUCING EROSION,
SEDIMENT LOSS, AND POLLUTED RUNOFF FROM
CONSTRUCTION SITES OR OTHER AREAS.

Prioritization of erosion and sediment controls for construction sites

Practice	Cost	Effectiveness
Limiting disturbed areas through phasing	\$	
Protecting disturbed areas through mulching and revegetation	\$ \$	
Installing diversion around disturbed areas.	\$ \$ \$	
Sediment removal through detention of all site drainage	\$ \$ \$ \$	
Other structural controls to treat sediment-laden flow	\$ \$ \$ \$ \$ \$	

The cheapest erosion and sediment controls are the most effective. For example, limiting the amount of bare soil by phasing your project and preserving existing vegetation are less expensive and work better than installing large storm water control basins or ponds.

SITE POLLUTANTS OF CONCERN:

- SEDIMENT
- CHEMICALS
- PAINT
- DIESEL
- GASOLINE
- CONCRETE WASHOUT
- CONSTRUCTION DEBRIS
- PORTA JOHNS
- VEHICLE WASHING
- TRASH





STORMWATER CONSTRUCTION BEST MANAGEMENT PRACTICES:

1. DOING NOTHING: IS NOT AN OPTION

2. CONSTRUCTION ENTRANCE:

A.) FILTER FABRIC UNDER LINER: 20' WIDE BY 50' IN LENGTH

B.) #2 (4-8" ROCK) TO A DEPTH OF 6 INCHES

CONSTRUCTION ENTRANCES:



DETENTION, SETTLING, AND RETENTION BASINS:

1. Professional engineers are required to design the basins.
2. Basins can be designed from simple to advanced
3. These are installed to prevent potential contaminants from leaving your site.
4. Sediment, debris, metals, particles, gas, diesel, oil, alcohol, process water
5. Basins are permitted outfall/ discharge points. Sampling during rain events is required.

SEDIMENT TRAPS, SEDIMENT BASINS, DETENTION BASINS, AND RETENTION BASINS:

WHERE:

- A.) LOW LYING SITES ON THE DOWNHILL SIDE OF BARE SOIL
- B.) TRAPS: RUNOFF FROM 1-5 ACRES
- C.) BASINS: RUNOFF FROM 5-10 ACRES
- D.) BASINS THAT DRAIN LARGER THEN 10 ACRES: REQUIRE AN ENGINEERED DESIGN; OFTEN ARE PERMANENT STORMWATER CONTROL TREATMENT PONDS OR DECORATIVE LAKES.

DO NOT PUT SEDIMENT TRAPS OR BASINS IN OR NEXT TO A FLOWING STREAM OR OTHER WATERWAYS WITHOUT FIRST CONTACTING THE DIVISION OF WATER AND POSSIBLY THE ARMY CORP OF ENGINEERS FOR REQUIRED WATER RESOURCES AND WATER QUALITY PERMITS.

SEDIMENT TRAPS & PONDS:



CONSTRUCTION OF BASIN IN A STREAM:



INDUSTRIAL BASIN:





SETTLING BASINS:



SILT FENCING:

PURPOSE: TO KEEP SEDIMENT FROM MOVING OFF SECTIONS OF THE SITE.

PLACEMENT:



- DOWNHILL EDGE OF BARE SOIL AREAS.
USE MULTIPLE FILTERS ON LONG SLOPES
- ON LONG SLOPES EVERY 60-100'
ENSURE IT IS INSTALLED CORRECTLY

INSTALLATION: EACH 100 FOOT SECTION OF PROPERLY INSTALLED FENCE CAN HANDLE RUNOFF FROM A 1/4 ACRE.

- DIG A TRENCH 6" DEEP
- MAKE SURE STAKES ARE ON DOWNHILL SIDE OF FENCE
- DRIVE STAKES IN UNTIL 8-10 " DEEP.
- PUSH FABRIC INTO TRENCH AND SPREAD ALONG BOTTOM
- FILL TRENCH WITH SOIL



OTHER TYPES OF SEDIMENT BARRIERS:

1. REINFORCED SILT FENCING
 2. WOVEN WIRE AND METAL POLES USEFUL ON SLIGHT OR MODERATE SLOPES.
 3. INSTALLING J-HOOKS
 4. FABRIC ROLLS
- 
- 

SILT FENCING DON'TS:

1. PLACE FENCING ABOVE BARE SOIL
2. PLACE IN DITCHES, CHANNELS, OR STREAMS
3. PLACE UP AND DOWN HILLS – RUN VERTICALLY

HOW TO INSTALL SILT FENCES:





SILT FENCING DON'T:



STORM DRAIN PROTECTION:

PROTECTION CULVERT AND DITCH INLETS AND OUTLETS. PURPOSE IS TO POND WATER TO ALLOW SEDIMENTS TO SETTLE BEFORE ENTERING THE STORM DRAIN.

1. SILT FENCING
2. CONCRETE BLOCKS AND #57 ROCK
3. MIXED ROCK DAM
4. STONE FILLED BAGS
5. FILTER TUBES
6. FILTER FABRIC INSTALLED IN THE DRAIN
7. NO STRAW BALES

STORM DRAIN PROTECTION:







OUTLET PROTECTION AND STORMWATER DISSIPATERS:

PURPOSE: TO PREVENT EROSION WHICH CAN CAUSE SEDIMENT TO BE PICKED UP AGAIN.

THERE ARE CHARTS AVAILABLE THAT HAVE DESIGN SPECS.

OUTLET PROTECTION AND STORMWATER DISSIPATERS:



STABILIZING DRAINAGE DITCHES:

PURPOSE: IS TO PREVENT EROSION AND LOSS OF SEDIMENT UNTIL VEGETATION IS RE-ESTABLISHED.

1. EROSION CONTROL BLANKETS
2. TURF MATS
3. ROCK CHECK DAMS: INSTALLED AT DIFFERENT SPACING FOR DIFFERENT SLOPES. THE GREATER THE SLOPE, THE CLOSER THEY HAVE TO BE INSTALLED.
4. PERMANENT RIP RAP

SLOPE PROTECTION TO PREVENT GULLIES:

1. SLOPES OF 3:1 OR STEEPER REQUIRE MORE PROTECTION.
2. LONG SLOPES GREATER THAN 50' NEED MORE PROTECTION.
3. STABILIZE IMMEDIATELY AFTER GRADING WORK IS COMPLETED.

SLOPE PROTECTION:



EROSION CONTROL BLANKETS:

1. USED ON SLOPES OF LESS THAN 3:1
2. ARE TEMPORARY AND ALLOW TIME FOR VEGETATION TO BE ESTABLISHED.
 - A.) TURF REINFORCEMENT MATS - USED ON SLOPES GREATER THAN 3:1
 - B.)HYDRAULIC SOIL BINDERS - HYDROSEED
3. ROCK LINED DOWNDRAIN CHANNELS MIGHT BE NEEDED ON STEEP SLOPES TO CONTROL GULLYING.

EROSION CONTROL BLANKET DON'TS:





EROSION CONTROL BLANKETS:





FILTRATION SYSTEMS:

1. SAND FILTERS
 2. BIO FILTRATION BASINS
 3. FILTER BAGS
 4. FILTER SOCKS
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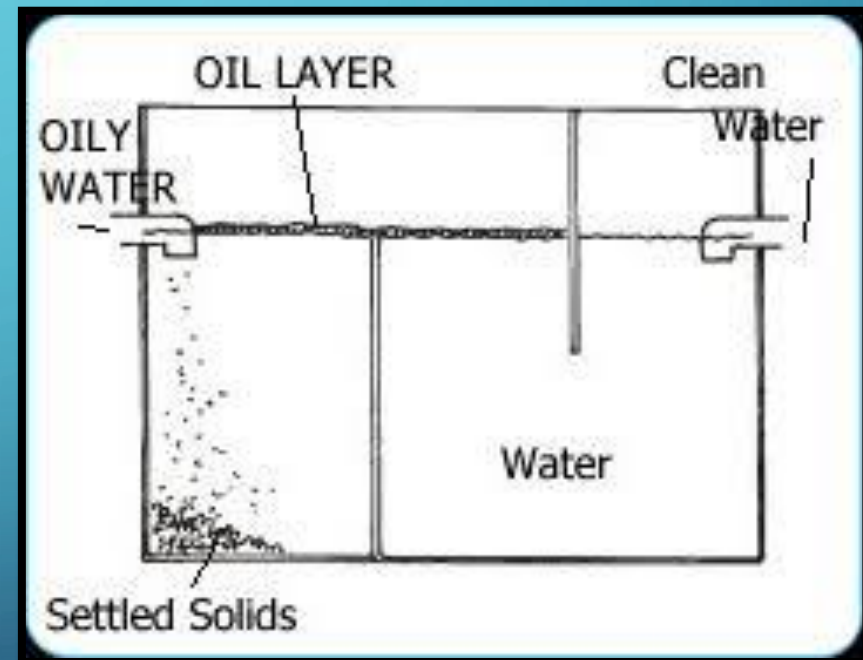
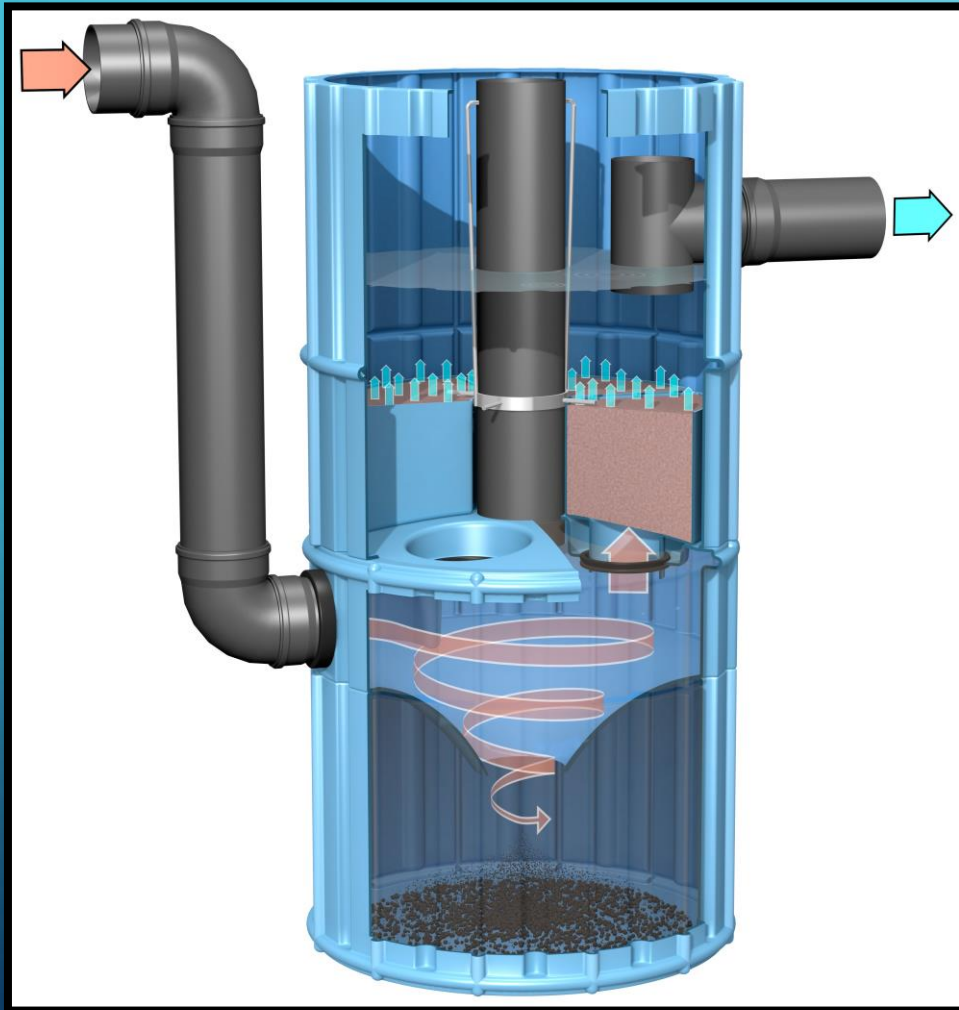
FILTRATION SYSTEM DON'TS:







FILTRATION SYSTEMS:





GREEN STORMWATER MANAGEMENT:

1. RAIN GARDENS

2. BIOSWALES

3. RAIN BARRELS

4. PERMEABLE PAVEMENT





RAINWATER COLLECTION AREA & STORMWATER BIOSWALE:







MISCELLANEOUS:

1. CONCRETE WASHOUT BASINS
 2. FUEL STORAGE
 3. SPILL KITS
 4. UNDERGROUND RETENTION BASINS
 5. TRAINING
- 
- 

CONCRETE WASHOUT BASINS:



FUEL STORAGE:



UNDERGROUND RETENTION BASIN:



The background is a blue gradient with faint concentric circles. White circuit-like lines with circular nodes are positioned in the corners: top-left, top-right, bottom-left, and bottom-right.

?Questions?